REMARKS

Pursuant to 37 C.F.R. §1.116, reconsideration of the instant application, as amended herewith, is respectfully requested. Entry of the amendment is requested.

Claims 6 and 8 are presently pending before the Office. Applicant has amended the claims. No new matter has been added. Support for the amendments can be found throughout the specification as originally filed and as described below.

The Examiner's Action mailed May 22, 2006 and the references cited therein have been carefully studied by Applicant and the undersigned counsel. The amendments appearing herein and these explanatory remarks are believed to be fully responsive to the Action. Accordingly, this important patent application is believed to be in condition for allowance.

Relying on 35 U.S.C. §102(b), the Examiner has rejected claims 6 and 8 as being anticipated by Zupancic or the abstract for JP 7-74260, and relying on 35 U.S.C. §103(a), the Examiner has rejected claims 6 and 8 as being unpatentable over the abstract for JP 7-74260 for the reasons outlined on pages 3 and 4 of the office action. Applicant respectfully traverses the rejection and requests reconsideration.

Applicant herein submits a translation of JP 7-74260 for the convenience of the examiner.

Applicant believes that the amendment herein presented overcomes the rejections of the examiner and accordingly requests that the rejections be withdrawn.

Support for the amendment

Support for "the upper limit of the number of moles of TEP per mol epoxy group is amended to 0.025 from 0.1"

It is described in Example 21 that "To 100 parts by weight of an epoxy resin (UVR-6410), were added 5.0 parts by weight of tetrakisphenols (TEP)"

In addition, although not described in the specification, UVR-6410 is a diglycidylether-type epoxy resin of bisphenol A and its epoxy equivalent weight (g/eq.) is 180-200.

In view of the above, the calculation result for number of moles of TEP per epoxy group is as follows.

Since UVR-6410 is a diglycidyl-type epoxy resin, it has 2 epoxy groups and its molecular weight from a rough calculation is twice as much as the epoxy equivalent weight, which is about 180-200 x 2 = 360-400.

On the other hand, the molecular weight of TEP is 398.

Therefore, UVR-6410 : TEP = 100 parts by weight : 5 parts by weight = 1 mol : 0.045-0.05 mol.

According to this result, the number of moles of TEP per mol epoxy group is 0.045-0.05 mol / 2 = 0.023-0.025, and applicant employed the upper limit.

2. Comparison of the present invention and cited references

1) Concerning number of moles of TEP per mol epoxy group in the claims

a) The present invention 0.001-0.025

b) Zupancic et.al. 0.07 calculated by the examiner

c) Japanese patent No.7-74260 0.18 in Example 1

0.17 * in Example 2

0.07 in Example 3

* Process for calculating 0.17

In Example 2, 50 parts by weight of an epoxy compound of formula (I) and 50 parts by weight of a cresol novolac type epoxy resin are comprised in the epoxy resin.

Epoxy equivalent weight of a cresol novolac type epoxy resin is 178. Therefore, assuming that a cresol novolac type epoxy resin contains 10 epoxy groups, its molecular weight is estimated roughly as 178 x 10 = 1,780.

When calculated based on the above, the number of moles of TEP per mol epoxy group was 0.17.

Incidentally, when calculated for a case where a cresol novolac type epoxy resin contains 20 epoxy groups, the number of moles is about 0.17. Therefore, the number of moles will not become smaller than 0.17 even though a cresol novolac type epoxy resin contains 10 or more epoxy groups.

As is obvious from the above, the number of moles of TEP per mol epoxy group in the claims of the present invention now falls within the range that is described in neither the Zupancic's patent nor Japanese patent No.7-74260.

2) Difference in the purpose of use

The present invention relates to a catalytic use of tetrakisphenols. This is also understood from the fact that the amount used is less than that in the cited references. Especially, the lower limit of amount used in the present invention is 0.001 which is considerably a small amount.

On the contrary, the cited references do not describe that their compounds are used catalytically. Particularly, Japanese patent No.7-74260 describes a use as a curing agent. A curing agent is something to be incorporated in a resin, so that it is apparent that Japanese patent No.7-74260 does not intend any catalytic use.

CONCLUSION

A Notice of Allowance is earnestly solicited.

If the Office is not fully persuaded as to the merits of Applicant's position, or if an

Examiner's Amendment would place the pending claims in condition for allowance, a telephone call to the undersigned at (727) 943-9300 would be appreciated.

Very respectfully,

Dated: 7/18/06

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[JP,07-074260,B]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

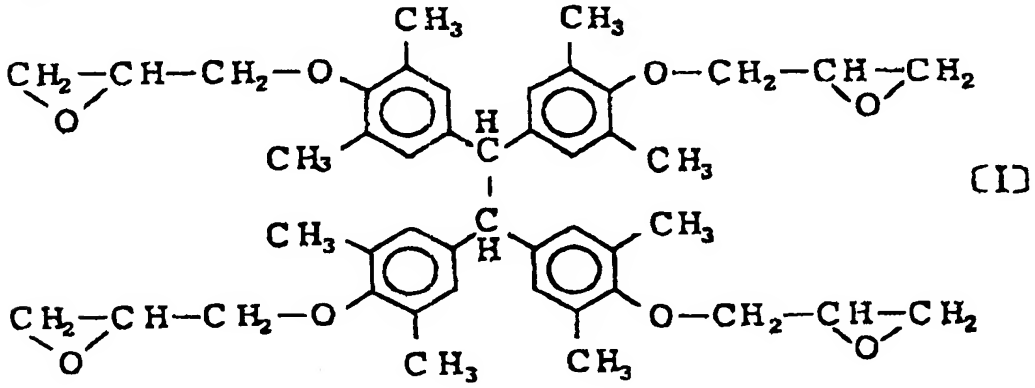
2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

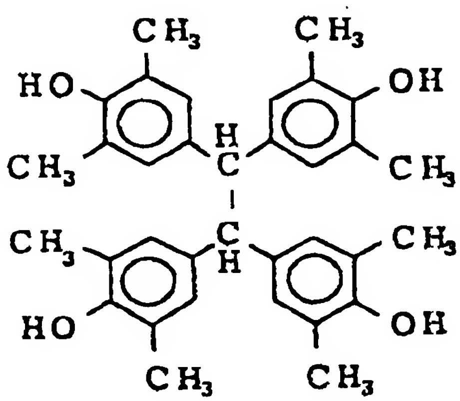
CLAIMS

[Claim(s)]

[Claim 1] The hardenability epoxy resin constituent the amount of epoxy compounds of the following formula [I] and whose total quantity of the amount of polyhydric phenols of the following formula [II] are 30 % of the weight or more to the total amount of epoxy resins, and the total quantity of a full hard-ized dose in the hardenability epoxy resin constituent characterized by consisting of a curing agent which contains the polyhydric phenol expressed with the epoxy resin which contains the epoxy compound expressed with the following type [I] zero to 100% of the weight, and which can be hardened, and the following type [II] 50 to 100% of the weight.



[I]



[II]

[Claim 2] a claim — the epoxy resin in which hardening of those other than the epoxy compound expressed with a formula [I] given in the 1st term is possible -- a cresol novolak mold epoxy resin -- it is -- a claim -- the claim whose curing agents other than the polyhydric phenol expressed with a formula [II] given in the 1st term are phenol novolak resin -- a hardenability epoxy resin constituent given in the 1st term.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

"Field of the Invention"

the low stress this invention excels [stress] in dependability -- and -- low -- water absorption — it is related with an epoxy resin constituent.

"Conventional technique"

In recent years, an advance of a semi-conductor related technique has a remarkable thing, and improvement in an LSI degree of integration, and detailed-izing of wiring and the enlargement of a chip size accompanying it are progressing.

Thereby, a close-up of the open circuit by A1 wiring deformation of a resin seal LSI, the resin crack, and corrosion etc. is taken as a big problem. In order to solve these problems, the reduction in the stress of semi-conductor closure resin and low water absorption-ization are demanded strongly. It is known widely that will use the epoxy resin for the semi-conductor closures into phenols as a polyfunctional epoxy compound and a curing agent, and it will use silica powder and a curing catalyst as an indispensable component as a bulking agent from the electrical property and a heat-resistant field.

Although the o-cresol novolak epoxy resin has been conventionally used as an epoxy

resin as resin for the semi-conductor closures, in the reduction in stress, and low water absorption-ization, a limitation is ******.

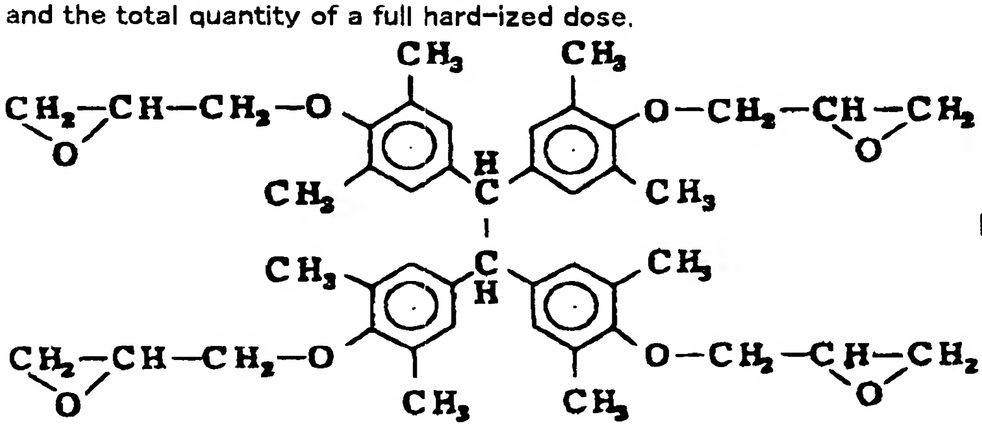
Moreover, problems, like although alkylphenols have been used [which introduces a hydrophobic group] into an epoxy resin frame as a means of the reduction in stress, for example as a means of use of synthetic rubber, use of silicone, and the reduction in water absorption, moldabilities, such as hardenability, weld flash, and a mold-release characteristic, spoil the thermal resistance of ******** and an epoxy resin for all are ******.

"The trouble which invention tends to solve"

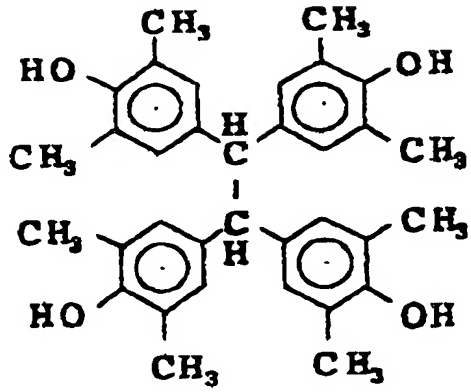
the hardenability epoxy resin constituent which is satisfied with the above-mentioned conventional technique of this invention, it ensures inside **** low stress and low water absorption, and is excellent in dependability, especially the epoxy resin constituent for the semi-conductor closures -- it is going to obtain -- it is a thing.

"The means for solving a problem"

this invention persons are obtained by use of the conventional o-cresol novolak epoxy resin etc. The low stress for the inside **** semi-conductor closures, The result studied in order to obtain a low water absorption epoxy resin constituent, In the hardenability epoxy resin constituent characterized by consisting of a curing agent which contains the polyhydric phenol expressed with the epoxy resin which contains the epoxy compound expressed with the following type [I] zero to 100% of the weight, and which can be hardened, and the following type [II] 50 to 100% of the weight It is the hardenability epoxy resin constituent the amount of epoxy compounds of the following type [I] and whose total quantity of the amount of polyhydric phenols of the following type [II] are 30 % of the weight or more to the total amount of epoxy resins, and the total quantity of a full hard-ized dose.



[I]



[II]

this invention constituent has a good moldability and gives the hardened material excellent in the crack-proof nature at the time of receiving moisture resistance and a thermal shock etc.

The matter of the above-mentioned formula [I] can be manufactured by making it react with the bottom epichlorohydrin of existence of an alkali-metal hydroxide, using the matter of a formula [II] as a raw material.

On the other hand, the matter of a formula [II] can be manufactured by carrying out condensation of 2 and 6 xylenol and the glyoxal to the bottom of existence of an acid catalyst.

In order to begin to attract the effectiveness of the reduction in stress, and the reduction in water absorption to the maximum extent, it is desirable to carry out whole-quantity use of the epoxy compound and curing agent by this invention, but effectiveness is demonstrated even if it mixes and uses it for other epoxy resins and curing agents. At least 30 % of the weight or more is required for the amount of the epoxy compound by this invention, and the curing agent used to the total quantity of all epoxy resins and a curing agent, and when it is below this weight, the effectiveness for which it asks by this invention is no longer acquired.

Moreover, although it is desirable to use together the epoxy compound and curing agent by this invention, even if it uses independently the polyhydric phenol of the formula [II] as a curing agent, it demonstrates effectiveness.

Other epoxy resins here mean the thing at large which has an epoxy group, for example, mean the bisphenol A mold epoxy resin and a novolak mold epoxy resin. Moreover, although other curing agents here are mainly phenol novolaks, an acid anhydride and an amine are available also for ******.

"Operation"

From the place which has two pieces and a total of eight methyl groups in each

benzene ring, and has the ethylenic linkage which is glyoxal residue in the center of a molecule, the epoxy compound expressed with a formula [I] has small water absorption, and gives the hardened material which is rich in the small flexibility of the dimensional change at the time of cold energy. Moreover, it is the polyfunctional epoxy compound which has four epoxy groups in a monad, and the hardened material of high thermal resistance with high crosslinking density can be obtained by using this. When the polyhydric phenol expressed with a formula [II] is used as a curing agent, the same thing can be said, and effectiveness is demonstrated.

"An example and the example of a comparison"

The epoxy compound and curing agent which were used in the example are as follows.

epoxy compound A: -- epoxy resin curing agent B: of the formula [I] by this invention -- it shows the weight section that it is [which is the polyhydric phenol of the formula [II] by this invention] with the section in an example and the example of a comparison.

After mixing an example 1 - 4 epoxy compound A, a curing agent B, a cresol novolak mold epoxy resin (trade name YDCN-702P, Tohto Kasei Co., Ltd. make), phenol novolak resin, fused silica powder, and other raw materials at a presentation rate shown in the 1st table, it kneaded by the ko kneader and the closure ingredient was prepared. Using these closure ingredient, the test piece was fabricated, pressure cooker processing (it abbreviates to PCT processing) of measurement of glass-transition temperature and 121 degrees C, and two atmospheric pressures was performed about what carried out 175 more degrees C and the post cure of 5 hours, and volume resistivity was measured. Moreover, after fabricating and carrying out the post cure of 40pin IC, for 60 seconds in [of 150 degrees C] a silicone oil, the thermo cycle test (crack-proof nature) which repeats immersion for 60 seconds in liquid nitrogen was performed, and the number of cycles until a crack occurs on the closure resin front face of IC was measured. These results are shown in the 1st table.

from the comparison with the example of a comparison shown in the 1st table, the semi-conductor closure ingredient by this invention is extremely excellent in crack-proof nature and a water resisting property -- understanding -- in addition -- and it turns out that it excels in thermal resistance from glass-transition temperature.

It was presupposed that it is the same as that of an example except having mixed at a presentation rate shown in the 1st table about the combination of an example of comparison 1 cresol novolak mold epoxy resin, and phenol novolak resin.

It was presupposed except having used the carboxyl group content acrylonitrile-butadiene copolymer (hiker CTBN 1300x8) as an example of comparison 2 flexibility grant agent that it is the same as that of the example 1 of a comparison.

It was presupposed except having used p-tertiary butylphenol for the purpose of the reduction in example of comparison 3 water absorption that it is the same as that of the example 1 of a comparison.

"Effect of the invention"

When this invention constituent is used as mentioned above, the low stress and the low water absorption hardened material which are excellent in the crack-proof nature when excelling in a water resisting property and thermal resistance, and receiving a thermal shock can be obtained.

Especially the role on the industry of under the situation that resin seal-ization will be increasingly expected for a semi-conductor closure application from now on, and the reduction in stress and low water absorption-ization are desired to this invention is large.

第 1 表 [Table 1] comparative

No.	実施例 Examples				比較例 Examples		
組成及び測定項目	1	2	3	4	1	2	3
(1) ←エポキシ樹脂A (部)	100	50	100				
(2) ←硬化剤B	50	50	20	50			
溶融シリカ	450	450	450	450	450	450	450
(3) ←クレゾールノボラック型エポキシ樹脂		50		100	100	90	100
フエノールノボラック樹脂			30		50	50	30
ハイカーCTBN 1300×8						10	
p-ターシャリブチルフエノール							20
γ-グリシドキシプロピルトリメトキシシラン	2	2	2	2	2	2	2
2-メチルイミダゾール	1	1	1	1	1	1	1
カーボンブラック	1	1	1	1	1	1	1
カルナバワックス	2	2	2	2	2	2	2
ガラス転位温度 (℃)	189	177	187	176	163	153	161
耐クラック性：ヒートサイクル数	94	64	88	66	6	54	16
体積固有抵抗(Ωcm) PCT前	3.1×10^{16}	2.9×10^{16}	3.0×10^{16}	3.0×10^{16}	2.7×10^{16}	2.9×10^{16}	3.0×10^{16}
体積固有抵抗(Ωcm) PCT後	2.7×10^{16}	2.6×10^{16}	2.6×10^{16}	2.3×10^{16}	1.5×10^{16}	1.5×10^{16}	1.8×10^{16}

(1) epoxy resin A

(2) curative agent B

(3) cresol novolac type epoxy resin